Development of a Qr Code-Based Student Worksheet in the Course of Media and Learning Resources Development to Improve Digital Literacy

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Abstract

This article is based on the limited number of reading materials and instructions in using a laboratory facility, so the development of media and learning resources is important to be updated using the encyclopedia and videos as the learning resources in the form of QR-Code. Therefore, this article aimed to develop media and learning resources by using a QR-Code to improve digital literacy. This article used the Plomp model consisting of problem identification and analysis phase, development and prototyping phase, and assessment phase. The data were collected by distributing an online questionnaire and analyzed by using the descriptive-quantitative method. Based on this development study QR Code-based student worksheets fulfilled the practicality of 83.40% in the 'practical' category and the effectiveness seen from the score of the students' literacy skills of 78.89% in the "Good/ Effective" category. The implication of this study is producing a product with a novelty and can be a reference for conducting effective and efficient learning.

Keywords: Student Worksheets, Media and Learning Resources, Digital Literacy

INTRODUCTION

The development of media and learning resources is a compulsory course for the students of the Natural Science Study Program as a scientific foundation

in Science education. The topics being learned are an experiment in proving the issues in natural science materials and the concepts that have been elaborated in the learning materials as well as the theories of learning media production. The Practicum Activities in the laboratory can be conducted well with complete laboratory equipment. Fitriyah *et al.,* (2018) explained that the applicability of an experimental method depended on the completeness of laboratory equipment.

A good laboratory is one that always complies with the laboratory regulations and safety as explained by Purnomo & Saputro (2016) that laboratory performance shall implement the laboratory health and safety principle. A laboratory becomes an important aspect in the accreditation to support an assessment for a certain study program. It is in line with a statement by Zhai *et al.,* (2019) that accreditation is currently used for proving the laboratory competencies. A laboratory can be a learning resource and learning media for university students.

The current problem is the limited reading materials and instructions in using the laboratory facilities. Suhada & Suryanto (2018), based on the result of their study, showed that the students' skills in experimenting were still low in the observation process, using laboratory equipment, interpreting and analyzing the data for the experiment as well as the way to communicate it. This becomes a model for the candidates of Natural Science teachers that innovations in Natural Science subject are important, especially the use of laboratory facilities in the form of learning media as the learning resources for university students.

A student workbook can help the students in using the laboratory facilities by following the methodology in an experiment or a lab course as learning media and resources. Nevertheless, Adisendjaja & Romlah (2007) explained that the current workbook still has inaccurate concepts or is abstract. A student workbook integrated with the 4.0 industrial revolution technology is required by using a QR-Code. Hidayat & Handhika (2018) explained that a package of learning media in the form of laboratory equipment is required for having relevancy to the media.

The 4.0 Industrial Revolution technologies include several network-based technologies, for instance, smartphones. The increase in Smartphone usage can ease the action of seeking the sources of literature in laboratory management technique learning. However, the problem is the use of smartphones tends to be used for social

life while the level of m-learning adoption (Lau *et al.,* 2017) the media integration in the learning (Rahayu *et al.,* 2019), and the competency in describing laboratory equipment and materials are still low (Zuhaida & Imaduddin, 2019).

A workbook in the development of media and learning resources needs to be updated by using an encyclopedia and videos in the form of a QR-Code. Ridwan in Haqi & Sinaga (2018) explains that QR-Code is a matrix code in a two-dimension form developed by Denso-Wav pada, a Japanese company, in 1994. The QR-Code implementation is strongly useful for explaining materials and minimizing a misconception in a workbook. It is supported by several studies by Ciptaning *et al.,* (2014); Azis *et al.,* (2018); Nugroho & Rosana (2018); and Noor (2018) that the use of a QR-Code in a reading material can explain the materials, improving the critical thinking, scientific skills, digital literacy, and is still effective to be used when the QR Code is damaged.

Based on the problems that have been elaborated, the development of a QR-Code in the students' workbook is required for improving digital literacy in the course of media and learning resource development. Therefore, this study aimed to develop the students' worksheets in the course of media and learning resource development by using a QR-Code to improve digital literacy.

METHODS

This study was a Research and Development (R&D) using the Plomp model (2013) including the problem identification and analysis phase, development and prototyping phase, and assessment phase (Haryanto, 2011). The first phase, problem identification and analysis, is defining whereby the researchers analyze the development experience, knowledge of QR-Code, and digital literacy skills. The development and prototyping phase was done by designing and arranging the cover of a student worksheet, guidebook, and data related to a forest fire as well as QR Code-based learning resources and media. Further, the student worksheets that had been made were analyzed and studied according to three expertise fields, namely education, education technology, and language. Next, the validation toward the worksheet was performed by the experts. The aspects being observed in the worksheet were the content component, language, graphics, and the program.

The assessment phase was done by conducting a field test on the research subject, namely 109 students of the Primary Education Program in UIN SUSKA, Riau. The experiment was carried out in one meeting through Google form. In this phase, the practicality and the effectiveness of a student worksheet that was being developed were observed. The practicality of the student worksheet was observed from the analysis result of the questionnaire that had been filled out by the students as the users. Meanwhile, the effectiveness of the student worksheet could be seen from the students' digital literacy skills after learning using the worksheet and their learning activities during the learning process. This study used the descriptive-quantitative technique for analyzing the data. Akbar (2013) stated that analyzing the validity level descriptively could be done using the following formula:

$$Va_x = \frac{TSe}{TSh} \times 100\%$$

Description:

: Total empirical score (the validation result by validators)
TSe

: Expected Total Maximum Score
TSh

: Expert Validation with
V_a $\qquad x = 1,2,3$

The result of the worksheet validation by the experts was calculated by using the mean score formula. The final validation formula is as follows:

$$V = \frac{Va_1 + Va_2 + Va_3}{3}$$

Description: V= Final Validation

= Expert Validation 1
Va_1

= Expert Validation 2
Va_2

= Expert Validation 3
Va_3

The percentage of validation results from each validator and the analysis result for the mean score by the validators can be matched using the validation category as shown in Table 1 below.

Table 1. Category of Worksheet Validation

Interval	Category
85.01 % - 100.00%	Strongly valid, or can be used without requiring any revision
70.01 % - 85.00 %	Quite valid, or can be used, but requires a minor revision
50.01 % - 70.00%	Less valid, not recommended to be used because requiring a major revision
01.00 % - 50.00%	Not valid, or cannot be used.

Based on Table 1 above, a worksheet is considered valid if the mean score of validation is in the 'quite valid' or 'strongly valid' category.

The analysis of a questionnaire for the students' responses was conducted to see the practicality of the worksheet being developed using the modified formula by Akbar (2013). The final score of students' responses was calculated using the mean score formula.

$$R = \frac{\sum P}{number\ of\ students}$$

Total Student

Description:

= The result of students' responses

R

= The percentage of practicality

$\sum P$

The obtained score was then interpreted using the category of practicality presented in Table 2 as follows.

Table 2. Category of Practicality

Interval	Category
85.01% - 100.00%	Strongly Practical
70.01 % - 85.00%	Practical
50.01 % - 70.00%	Less Practical
01.00 % - 50.00%	Impractical

Based on Table 2, a worksheet is considered practical if the mean score of validation is in the 'practical' or 'strongly practical' category. The QR Code-based worksheet is considered effective if the learning objectives that have been planned were achieved resulting in better students' learning outcomes. In this study, the digital literacy skills were obtained from the affective aspect in the form of a questionnaire that was distributed after using the QR code-based student worksheet. The students' digital literacy skills, in the learning outcome, namely minimum of 75% based on the score of Minimum Criteria Mastery (KKM) of 75 (Furdan, 2015).

RESULTS AND DISCUSSION

In developing this worksheet, the development procedure consisted of three phases. Those phases for worksheet development using the Plomp model are elaborated as follows.

Preliminary Research (Problem Identification and Analysis Phase)

In this phase, several activities consisting of the analysis of development experience, knowledge of QR-Code, and digital literacy skills.

Based on the result by distributing an online questionnaire, most lecturers and teachers had never participated in the training on devising a QR-Code. This thwarted them to conduct development and deal with many difficulties in developing a QR-Code. Based on the analysis performed by the researchers, training on the process of product development, especially QR-Code, was required to make the lecturers and the teachers have no difficulties in developing a learning product. Furthermore,

the result from the questionnaire showed that QR Code-based worksheets will be a requirement for supporting and welcoming the digital world. Then, the digital literacy skills were in the "GOOD" category with an average percentage of 74% (Agree), even though they have not fulfilled the minimum standard mastery. Thus, the respondents agree with each question item about digital literacy. It is supported by the respondents' habits in selecting and seeking information from many sites on the Internet through several web browsers. To support the students' digital literacy skills, the development of QR Code-based Worksheets is one of the best solutions.

The result showed that most lecturers and teachers had never participated in the training on devising a QR-Code and it thwarted them to conduct development and deal with many difficulties in developing a QR Code. Therefore, the lecturers and the teachers need several activities to participate in the training on developing media and QR Code-based teaching. The implementation of training and development shall be based on the school community's needs and culture to make the training closer to the reality that happened at school (Windrawanto, 2015; Qondias *et al.,* 2018). Training provides an opportunity for the teachers to acquire new knowledge, skills, and attitude that change their behavior, and it eventually will increase the students' learning outcomes (Juniantari, 2017). Training shall be appropriate with the teachers' needs for teaching. The coordinators shall plan each training carefully, starting from selecting topic, time, place, method, up to the quality of an instructor (Gunawan et.al, 2020; Taqib et.al, 2016). Such training will facilitate the teachers and lecturers in implementing the output obtained from the training and recommend it to other teachers and lecturers. The expected training output is certainly the one that is applicable at school/campus and affects the students.

The result showed that most lecturers did not know about a QR Code, but the majority of teachers and university students had already known that. QR Code is a two-dimension picture representing the data, especially for the data in the form of texts. QR Code is an evolution of a barcode from one dimension into two dimensions. A QR Code contains both vertical and horizontal information, while a barcode only contains one-way data. The total information contained in a QR Code is away higher than that of a barcode (Narayanan, 2012). A QR Code can rapidly produce and access the data freely; it can be read using a Smartphone. It has been becoming popular in several countries and becoming more popular in the United States (Jackson, 2011). The QR Code dimension

can store bigger data than the barcode. Presently, the use of a QR Code is extremely common. Many countries in the world, especially Japan, have implemented the QR Code technology in their consecutive industry. In Indonesia, the use of a QR Code is not very popular. However, you can download the QR code reader application for all types of smartphones for free through the Internet (Ridwan et.al, 2010).

Several QR code implementations in education as (i) classroom management: providing teachers' contacts to the students, making an exam schedule, and marking the identity of a class team; (ii) Learning activities: devising a book containing a QR code, linking it to the source of educational multimedia on the Internet (URL) or Youtube, providing nutrition information, and marking the information of human skeleton; (iii) Evaluation: using a QR code for creating a questionnaire; (iv) in the investigation; literature tracking on the Internet (Walanda, 2012).

In the literature, the researchers found that a QR code could support the students' learning in field-based activities. With a QR code immersed in the environment, the students can obtain contextual information (Osawa *et al.,* 2007). A QR code is a two-dimension matrix barcode designed by a Japanese company known as Denso Wave in September 1994 (Qi, 2004). The code consists of a black module arranged inside a box functioning as coding, image search, connection, image distribution, and image correction. The benefits of using a QR code are a big data storage capacity, a wide range of coding, a small printing, a wide coding range, a code reader with a high-speed reading, and the ability to correct mistakes (Mustakim et.al, 2013). The study on a QR code implementation in learning can be put in the mobile learning context. A QR code is a barcode consisting of a black module with a white background. The square pattern code can contain information, such as texts, URL links, or other data that can lead the users to further sources of information about a certain topic (Lee et al, 2011). A QR code also allows the innovative system implementation based on the paradigm of the just-in-time learning model and collaborative learning (De Pietro & Frontera, 2012). Using a QR code also let the people link the digital resource to the printed texts. It potentially enriches the paper-based learning materials.

The abundant learning materials can serve and motivate the students with different learning needs (Chen, Teng & Lee, 2010). So far, only some educational institutions use a QR code technology, such as the University of Bath (Ramsden, 2008), Hongkong Institute of Education, Mie University (Susono & Shimomura,

2006), and IPB-Bogor. Besides learning, some documents also show personal management applications and QR code, for instance, the learning history using a QR code (Chen & Choi, 2010), library catalog and course task entry (Ramsden, 2008), and English learning (Liu, Tan, & Chu, 2007). ICT has spread to the educational sector, and above all, it positively affects the learning process in the classroom or conference room. Some examples are the use of cellular technology in learning in higher educational institutions (Wexler *et al.,* 2008) SMS-based teaching (Short Message Service) (Markett *et al.,* 2006; So, 2009). Based on the explanation above, the researchers were interested in trying to use a QR Code in the course of media and learning resources.

The result showed that the digital literacy skills were in the "GOOD" category with an average percentage of 74% (Agree) even though it did not fulfill the minimum standard mastery. The competency of digital literacy is beneficial for dealing with information from many digital sources that continuously develop along with the development of information and communication technology as an impact of media convergence phenomenon. Media convergence is a combination process of some mass media and information technology in a technological device that increasingly facilitates the owner to access some information and programs (Giovanni & Komariah, 2020). Consequently, convergence is defined as an integration of the function of some media into a new and more sophisticated media. New media is specifically intended for Internet-based or World Wide Web (www)-based digital media (Mamis, 2020). The emergence of the Internet eventually initiates the occurrence of information overload. This is related to the Internet characteristics that can connect information from any part of the earth, so the information dissemination can be done easily and rapidly. Moreover, through the Internet, someone can easily perform the search of information by using digital media without any limitation of space and time.

Digital literacy is a series of media literacy movements designed to increase individual control towards the media that they use for sending and receiving messages. The keyword of the importance of media literacy is the way of how we have a filter or control of the media that can be used for seeking information and entertainment (Lestari & Dwijayanti, 2020). The legal foundation needs to be introduced as the knowledge that the activity of media literacy is protected by the laws and regulations. The scope of media literacy is technology literacy, information

literacy, responsibility, and competency (Hanik, 2020). Knowledge of technology literacy that is considered relevant to the technology determination states that people in their life follow the technology development.

Literacy in the digital era is strongly different from the literacy that is formed in the previous industrial era. The digital world is more directed to the communication activity, building a relationship both in the form of business relation or friendship, thinking, and other activities related to digital media (Amelia & Ulumu, 2019). Developing the definition of digital literacy is a part of an effort to understand how the media affects several activities related to literacy (Sutrisna, 2020). In other words, digital literacy, presently, is not only a place for seeking information for doing course assignments but also a form of a need that is inextricably linked.

University students in this cyber era enjoy accessing the information sites on the Internet, accessing online games, and using social media and applications that facilitate friendship in their sophisticated gadgets. The students' life these days is like non-existent if they do not have and use a gadget; let alone, the need of a gadget has shifted from a tertiary need to a primary need. The students' activities that are inextricably linked to the digital world shall be supported by a good capacity for understanding digital literacy. Poor digital literacy will affect the students' psychology that will tend to insult others, being jealous, depressed, and sometimes negative mood and negative comments towards the thing they see and open in the digital media (Amelia & Ulumu, 2019). By the students entering the digital world, the course of media is good to be delivered to the first semester students. Setyawan et al. (2017) stated that media education aimed to develop critical thinking and active participation that can make the youths (students) think based on what they see and the information they get.

According to the observation result, the students used every opportunity using voice communication data communication. The massive use of digital media shall also be balanced with a good understanding of the role of media. Therefore, critical thinking of digital media literacy is a skill that the students shall have. This is important to make the students prepared psychologically to deal with many challenges in the 4.0 Industrial Revolution eras. Young generations as an integral part of people shall exist and criticize the current changes.

Development and Prototyping Phase

A student worksheet is designed and developed referring to the characteristics of a guided invention. The student worksheet is designed to help the students in rediscovering the principles/procedures available in the materials of media and learning resource development. The development and prototyping phase is presented in Figure 1 as follows.

Figure 1. Design of QR Code-Based Worksheets

The result of the student worksheet development was submitted to the experts to be assessed. The student worksheet was validated by 25 validators consisting of teachers and lecturers. The experts becoming the validators were from the expertise areas, namely education, education technology, and language. Further, validation

toward the student worksheet was conducted by experts. The aspects observed in the student worksheet were the content, language, presentation, graphics, and program. The validation result for all assessed aspects can be seen in Table 3.

Tabel 3. Overall Validation Result of a QR code-based Student Worksheet by Experts

No	Aspect	Mean Score	Category
1	Content	4.46	Strongly Valid
2	Language	4.47	Strongly Valid
3	Presentation	4.49	Strongly Valid
4	Graphics	4.34	Strongly Valid
5	Program	4.41	Strongly Valid
	Average Score	**4.43**	**Strongly Valid**

Table 3 displays that the overall average score of the student worksheet validation is 4.43 in the "strongly valid" category. It can be inferred that QR code-based Student Worksheet is valid according to the experts, so it can proceed to the assessment phase.

A QR code-based student worksheet is considered valid by the validators through the observed components, namely content, language, presentation, graphics, and program. The content component for the QR code-based student worksheet obtained an overall validity score of 4.46 in the "Strongly Valid" category. It indicates that content from the materials in the QR code-based student worksheet is considered good and complete according to the validators. The language component of the QR code-based student worksheet obtained an overall validity score of 4.45 in the "Strongly Valid" category. This shows that the use of language in the QR code-based student worksheet is considered good and understandable. The component of presentation and graphics in the QR code-based student worksheet obtained an overall validity score of 4.49 and 4.34 consecutively in the "Strongly Valid" category. It means that from the presentation aspect, the QR code-based student worksheet is considered good and attractive. The component of the program in the QR code-

based student worksheet obtained an overall score of 4.41 in the "Strongly Valid" category. It indicates that from the aspect of programs, the QR code-based student worksheet is considered good and can be used well in the learning process.

Based on the categories obtained by each component, the QR code-based student worksheet obtained an overall validity score of 4.43 in the "Strongly Valid" category. It shows that, according to the experts, this QR code-based student worksheet is valid and can be used in the learning process. Thus, this QR code-based student worksheet is appropriate and eligible to be used. This QR code-based student worksheet is considered valid. According to Thahir et al. (2018), the criteria assessed by the experts are content feasibility, language, presentation, and graphics. It is supported by Soewondo & Yuliani (2019) mentioning that the QR code-based student worksheet is considered valid if the four development requirements obtain a validity score of more than 2.50 in the "valid" category.

The first aspect, content feasibility, includes materials. The materials presented in the QR code-based student worksheet were relevant to the concept referring to the definite theory and could be applied in daily life; consequently, if the presented materials referred to the theory, the development of a QR code-based student worksheet was appropriate to the regulation by the Ministry of Education and Culture. According to Sulastri & Adnan (2017), the material applied in the development of a QR code-based student shall have a strong relation to the surrounding environment, so the students can perform a hands-on observation of the environment and get learning experience to be applied in the daily life. Herianto & Indana (2020) stated that if the activities in the QR code-based student worksheet train the students to discover a material concept based on the surrounding environment or daily life, the students are trained to construct knowledge, analyze a problem, and know how to solve the problem.

The second aspect, language use, in the QR code-based student worksheet did not have any multiple interpretations and the terms used in it were easy to be understood and consistent. Suwahru et al. (2018) stated that the language use in the QR code-based student worksheet shall be understandable and relevant to the students' levels of development as if the students have direct interaction with the author. Besides, the sentences in the QR code-based student worksheet are formal,

understandable, and do not have ant multiple interpretations. Untari et al (2018) stated that a good QR code-based student worksheet shall have a communicative language to make the students easy to understand the instructions in the QR code-based student worksheet.

The third aspect is presentation and graphics. The system of presentation and graphics in the QR code-based student worksheet shall be presented consistently, conceptually, coherently, and according to the required significance of materials (Khafida & Ismono, 2021). The supporting aspects of presentation and graphics are attractive pictures, color, layout, and design for the QR code-based student worksheet as well as the text that can grow the students' motivations and interests during the lesson using the QR code-based student worksheet. The statement is in line with Herianto (2020) that one of the requirements of good presentation in the QR code-based student worksheet is an attractive presentation, especially from the color, font, and picture. It is in line with Elista & Kuntjoro (2020) stating that the cover design, color, and picture in the QR code-based student worksheet in the QR code-based student worksheet that is appropriate to the materials will be more effective to know the content presented in the QR code-based student worksheet, so it can ease the students to catch the ideas or information. The presentation in compiling the QR code-based student worksheet needs to be concerned to make the lesson more meaningful and the students will be easy to catch information that can increase the students' learning interests. It is supported by a study conducted by Kustianingsari (2015) on digital comic media that the developed picture is categorized as excellent with a score of 95%; moreover, Disnawati & Nahak (2019) also stated that color variation and picture in the QR code-based student worksheet shall be interesting and appropriate to the materials. It strongly affects the students to grow their motivation and enthusiasm in learning using the QR code-based student worksheet.

Assessment phase

A field test was conducted in the assessment phase. After being revised based on the input made by a small group, the trial test is applied to the device against the research subject, namely 109 students of the Primary Education Program in UIN SUSKA, Riau. The trial test was conducted in one meeting through G*oogle*

form. In this phase, the practicality and effectiveness of the QR code-based student worksheet were observed. The practicality of the QR code-based student worksheet was seen from the result of a questionnaire that has been filled out by the students as the users. Meanwhile, the effectiveness of the QR code-based student worksheet can be seen from the students' digital literacy skills after having the lesson using the QR code-based student worksheet and the students' learning activities during the learning process. The questionnaire for practicality was distributed to the students after following the learning process using the QR code-based student worksheet. Overall, the result of a questionnaire for the practicality filled out by the students can be seen in Table 4.

Table 4. The Result of a Questionnaire for Practicality by the Students in General in the Field Test

No	Assessed Aspect	Practicality (%)	Category
1	Usability	83.67	Practical
2	Presentation	84.49	Practical
3	Readability	83.49	Practical
4	Efficiency	82.86	Practical
5	Effectiveness	82.49	Practical
	Average Score	**82.40**	**Practical**

Based on Table 4 above, the average score for practicality is 82.40% in the "practical" category. It means that, based on the questionnaire for practicality filled out by the students after the field test, the QR code-based student worksheet is considered practical.

The QR code-based student worksheet is observed through the questionnaire that has been filled out by the students as the users of the QR code-based student worksheet. The components assessed for the practicality of this QR code-based student worksheet were usability, presentation, efficiency, and effectiveness. Based on the questionnaire filled out by the students, the QR code-based student worksheet obtained a mean score for the aspects of practicality, namely 83.67% for

the usability in the QR code-based student worksheet in the "practical" category, 84.49% for presentation in the "practical" category, 83.49% for efficiency in the "practical" category, and 82.86% for effectiveness in the "practical" category. Overall, with the mean score of 83.49% for efficiency, the average score for practicality is 82.40%.

Based on the questionnaire filled out by the students, in the aspect of usability, the QR code-based student worksheet is easy to be used and carried, and the lecturers suggest the students leave their printed books and bring their QR code-based student worksheets to minimize the weight of their bags. The reason is that the QR code-based student worksheet, according to the lecturers, is complete and the exercises in it can be solved by the students well. The material presentations in the QR code-based student worksheet attract the students and the pictures and illustrations in it facilitate the students to understand the teaching materials. According to the students, the QR code-based student worksheet is efficient and effective to be read. It means that the QR code-based student worksheet is practical according to the students as the users.

The practicality of a QR code-based student worksheet is determined by the users' evaluation. It is in line with the opinion by Farida et al. (2019) that the users of a QR-Code are expected to be able to facilitate the teachers in delivering the problems used in the learning. The lecturers only need to find a problem that will be discussed in the learning materials and apply it in the QR code; thus, the students can easily and rapidly get the information. It shows that the QR code-based student worksheet delivered the materials clearly and in a simple manner, and the overall content of the QR code-based student worksheet is understandable; the font and font size are readable. It also has a practical size completed with clear general instructions. It is in line with a study by Mirza et al (2019), stating that the standard of language or readability in the QR code-based student worksheet includes using Indonesian well and correctly, the clarity of language, and readability. These practical criteria show that the QR code-based student worksheet was efficient and effective to be used in the learning. The learning hours become more efficient and the students can study based on their competencies. According to Lestari et al. (2018), one of the practical considerations to be noted is that time required for the process of using a DIY instrument should be short, fast, and accurate. As proposed by Setiawan &

Saputri (2020), learning by using the QR code-based student worksheet can make the learning process more efficient. The QR code-based student worksheet can be used for speeding up the learning process and completing the learning material in the textbook. Therefore, the teachers shall consider the use and the easiness of teaching material for the students by fulfilling the aspect of practicality, namely usability and the applicability of the teaching material.

In this study, the digital literacy skills were obtained from the affective aspect in the form of a questionnaire that was distributed after using the QR code-based student worksheet. The questionnaire consists of 14 items of objective questions. The percentage for the mastery of digital literacy can be seen in Table 5.

Table 5. The Percentage for the Mastery of Digital Literacy

	Mastery Level		
	Proficient	**Unproficient**	**Total**
Total Student	77	32	109
Percentage	70.64%	29.36%	100%

The final test in Table 5 shows that the students have achieved 70.64%. The percentage of the students achieving more than the classical mastery was 70%. It means that the QR code-based student worksheet is effective.

Effectiveness is related to the impact of the QR code-based student worksheet on the final test of study, namely digital literacy skills. The final test was given in the form of a questionnaire consisting of 14 question items. The score of the final test was compared to the Minimum Mastery Criteria determined by the school. If it is compared to the score of Minimum Mastery Criteria of 70, 77 out of 109 university students obtain a score over the score of Minimum Mastery Criteria. Based on the learning outcome for digital literacy skills, the students have a classical mastery level of 71% exceeding the predetermined classical mastery level of 70%. This result is reinforced by Damopolii et al. (2019) that the effectiveness is met if the students achieved the predetermined score of minimum mastery criteria of 70. This indicates that the students can comprehend the lesson and enhance their knowledge by using

the QR code-based student worksheet. According to Subagia & Wiratma (2016), learning outcomes reflect the students' competencies to measure their performance and achieving the basic competencies functions as a guide to behavioral changes that will be achieved by the students related to the learning activities. It is in line with the statement by Khamidah et al. (2019) in her study that, in the learning process, the teachers use the teaching materials with high effectiveness to give a good impact on the students' learning achievement.

The analysis result also obtained that the student's digital literacy skills were in the "GOOD" category with a percentage of 78.79%. Based on the result, the students are demanded to master the technique of searching information on the Internet, finding sites relevant to the course materials, presenting materials through attractive websites they want (Mahnun, 2018). The item stating "I frequently search for information through several search engines, such as Yahoo, Ask, Google, and the like" obtained a percentage of 84.77%. Based on the result, it can conclude that the respondents have a good capability in seeking and selecting information in the digital room. The students are, indeed, having a good capability in seeking information, but they lack efficiency in seeking the information they need (Gani *et al.,* 2020).

The process of seeking required information is strongly related to information literacy (Adisendjaja *et al.,* 2019) . For that matter, information literacy shall be possessed by each person, especially in the information era that is getting more globalized and the people become more competitive, including university students. The pattern of information in a university student will strongly determine the process of developing his/her intelligence. If a student's information is inaccurate, it will affect the information he/she receives. On the other hand, if a student's information is accurate, he/she certainly will get accurate information. The finding supports the result of the previous studies stating that the percentage of digital literacy level for the safety component is the "good" category (Nada & Sari, 2020).

Further, we understand that the students prefer using the Internet in the process of seeking information to reading textbooks because browsing through the Internet is easier, fast, and updated even though it is not as complete as in the textbooks. The study conducted by Mudawamah (2020) stated that the students in public universities, such as UIN Maulana Malik Ibrahim, frequently seek information through the Internet. This shows that the respondents have an excellent capability

in operating a computer and ICT in the Internet sector for the component of functional skill and beyond. Millennials have good skills in operating a computer and accessing the Internet. It is common because nearly all university students have a smartphone and spend their time mostly surfing through the Internet (Kurniawati & Setyaningtyas, 2022; Rahmadani, 2020). Based on the result, it can be inferred that learning using the QR code-based student worksheet that has been developed can improve the students' digital literacy skills. It can be seen from the number of students who pass the score of minimum mastery criteria in the course of media and learning resources.

CONCLUSION

The result of the research and development concludes that 1) the process of developing the QR code-based student worksheet consists of preliminary research (problem identification and analysis phase), development or prototyping phase, and assessment phase. This product presents the facility of the information and communication technology-based teaching material combined with videos, texts, and pictures. The product is in the form of a QR code-based student worksheet from content, lenguage, presentation, graphivs, and program, that has met the validity criteria of 4.43% in the "Strongly Valid" category 2) the product in the form of a QR code-based from a usability aspect Presentations, Readability, Efficiency, Effectiveness student worksheet has met the practicality criteria of 83.40% in the "Practical" category, and 3) product in QR code based form LKS in terms of results or classical completeness level, which is 71% exceeds the predetermined classical completeness level of 70%. this met the effectiveness criteria as assessed by the students' digital literacy skills of 78.89% in the "Good/Effective" category.

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